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THE MANUFACTURE OF BINDING-TWINE.

BY PROF. L. E. SAYRE, STATE UNIVERSITY.

The manufacture of binding-twine is a subject which has presented itself quite forcibly during the past years to the farmers of the State of Kansas. Everyone knows that the farmers have been obliged to pay an unreasonable price for this article, and the question presents itself, is it feasible for those who would help the agricultural industry, to manufacture binding twine near at home, and thus not only probably reduce the price of this article, but encourage the raising of such vegetable material as would furnish a fiber suitable to the same?

The manufacture of binding-twine, it is presumed, is familiar to all. It may not be amiss, however, to say that the hemp furnishes a fiber sufficiently tenacious for all the purposes of manufacturing binding-twine. It is a product that does well in eastern Kansas, and in the early history of the State yielded handsome returns to the cultivator; but for the want of a home market and the high cost of freighting it to a distant market, it is said to have ceased to yield a profit on its cultivation. It requires a rich soil and heavy manuring, and is an exhausting crop. Yield per acre, 10,000 to 20,000 pounds of hemp; cost, about \$10 to break and hackle it.

The oil from the seeds is quite marketable. It has drying properties, though inferior to linseed.

The following table shows the amount raised in the State of Kansas for a few years back:

<i>Years.</i>	<i>Average</i>	<i>Pounds.</i>	<i>Value.</i>
1885.....	232	208,800	\$10,400 00
1886.....	158	110,600	5,530 00
1887.....	327	228,900	11,445 00
1888.....	229	167,300	8,365 00

The average yield of fiber per acre in the United States is said to be from 700 to 1,000 pounds.

If the subject became a matter of much interest to scientific men, and if their attention were concentrated upon it, doubtless their investigation would lead to the discovery of plants yielding a fiber of a quality sufficient for all the practical purposes of the grain-binder, and indigenous to Kansas soil.

I may remark incidentally, as a matter of interest in connection with this subject that it is said to have been demonstrated that the cotton stalk, which has hitherto been regarded as waste, contains valuable fiber. A lot of the stalks was recently sent from Arkansas to a factory in New York to be operated on in the same manner as flax and hemp. There were returned about twenty different grades of fibrous material, from coarse strands of the stalk to the glossy fiber as soft as silk. Persons are now engaged in perfecting a machine that will spin the material. The fiber is sufficiently strong to make the best of bagging, as well as cloth as fine as linen. I have no question that the stems of many of our native weeds would be as valuable as the cotton stalk for the same purpose, if they were properly worked up.\*

In former years it was customary for the farmers of this State and elsewhere to bind the wheat, oats, etc., with iron wire, which had the serious disadvantage of being a source of considerable injury to horses and cattle, and to the threshing and

\*It may be known that there has of late been invented a process of working common straw into binding-twine. This bids fair to revolutionize the whole industry.—L. E. S.

milling machinery. In spite of the greatest care, pieces of wire and nails would get into the machinery, and finally the feed, which, as stated, became a very serious obstacle in the way of using wire. It was customary to use magnets to take out all of the metallic contaminations, and I have heard it stated that it was quite amusing to see the odd pieces of metal that would be taken out by this means—nails, screws, parts of buckles, etc. The magnet was found to be inadequate; the metallic contamination would remain in spite of the magnet, and often to such an extent as to render the feed positively dangerous for horses or cattle. Binding twine thus became an absolute necessity for the cereal products.

In 1883 there was started in Lawrence a manufactory of twine. This establishment was at first confined to the making of hemp cordage. The capacity of the mill was 20,000 pounds per day. After a time the idea was suggested that binding twine could be made profitably; and for this purpose a mixture of hemp and "sisal" was used. The name "sisal" is derived from its habitat, Sisal, a part of Yucatan. The fiber is known in the market as sisal-hemp or sisal-grass, and is prepared from the *Agave Americana*.

The feasibility of making this product was arrived at by the following considerations at the time: The company having in charge the above manufactory figured that the sisal could be brought here and made for 8 to 9 cents per pound—wholesale at 12½ cents per pound. Now the price is 15 to 17 cents per pound, and the market is controlled by what is practically a trust. I may add in passing, that the relation which sisal twine bears to hemp is about the relation of linen thread to cotton—sisal representing the linen. At this time there was made on the product of this factory a profit of 50 per cent. It would prolong this paper unduly to trace the history of this enterprise further; but I will state that the manufactory was discontinued for the reason that the manager was found to be an impractical man, and his financial ability was insufficient to meet the demands of so large a concern. It was just as well that it was discontinued, for the "trusts" would have made its maintenance impossible in a short time. The method adopted by the trust for the purpose of controlling the market in such a case was to negotiate for the purchase of the factory, of its product, or to lease the factory. If neither of these could be accomplished, the trust would "freeze the factory out"—a term well known to the trade.

Speaking with one of the capitalists of Lawrence, I learned that money could be raised now, in Lawrence and elsewhere in the State, to start and help along an industry of this kind.

These are the figures for a mill of \$20,000. This amount would cover the cost of machinery as follows: One lapper and comber; one drawing-frame, medium size; two spinning-machines, which spool the thread; one balling-machine—balled from spools. This factory will have the capacity of 15 tons per week, running 24 hours per day. Six men would be required to run such a mill. A capital stock of \$25,000 would pay for plant, machinery, and stock. To keep stock ahead, which would be necessary, the bankers would loan on stock in hand.

I should state in closing, that this paper has been written at the request of the Secretary of the State Board of Agriculture, Hon. M. Mohler, who desired me to investigate the matter for his satisfaction.